8/10/82

DYNAMAC
CORPORATION

NALED

Task 3: Environmental Fate Profile

Contract No. 68-01-5830

Final Report

August 10, 1982

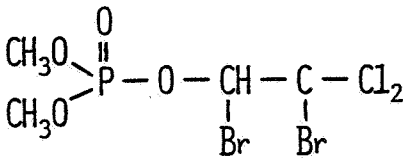
Submitted to:

Submitted by:
Dynamac Corporation
Enviro Control Division
The Dynamac Building
11140 Rockville Pike
Rockville, MD 20852

NALED

Task 3

NALED, BROMEX, DIBROM, RE 4355



1,2-Dibromo-2,2-dichloroethyl dimethyl phosphate

Environmental Fate Profile

Available data are insufficient to fully assess the environmental fate of naled.

Naled (formulation unspecified), at 10 ppm, rapidly degraded with half-lives of 1.4-4.0 hours in soils ranging in texture from sand to silt and incubated at 80% field capacity and room temperature (00074759). The degradate dichlorvos was found at a maximum concentration of ∿10% of applied naled within 24 hours after treatment. Dichlorvos (10 ppm) also rapidly degraded in the test soils, with half-lives of 2.3-8.0 hours.

Naled (100 µg/ml) degraded rapidly in aqueous solutions buffered at pH 5.0, 7.0, and 9.0 (00074691 and 00074885). Half-lives at 21 C ranged from ∿0.25 to 25 hours, whereas those at 37 C ranged from 0.05 to 6 hours. Naled (100 µg/ml) also degraded rapidly in sewage water samples (pH 7.0) incubated at room temperature, with a half-life of 23 hours; dichlorvos (3 µg/ml) was also detected (00074644).

Radiolabeled naled exhibited low to intermediate mobility in soils ranging in texture from loamy sand to clay based on soil thin-layer chromatography tests (00064796). Dichlorvos was intermediately mobile to mobile in the same soils. Mobility of both compounds may be related to soil organic matter content.

Dissipation of naled (Skychoda, 34.9% ai, formulation unspecified) in sewage water was rapid following addition of ∿5 ppm to a trickling filter in a sewage treatment plant (00074645). A maximum of 0.04 ppm was detected 20 minutes after treatment, but after 24 hours, no naled was detected (<0.015 ppm). The breakdown products dichlorvos and dichloroacetaldehyde were detected at maximum concentrations of 0.4 and 0.04 ppm, respectively, 20 minutes after treatment, but neither compound was found in samples taken 24 hours after treatment.

Naled, at 2 ppm, had little or no effect on the respiration of Azotobacter vinelandii; however, at 100 ppm, respiration was inhibited ∿90% (05005579). Dichlorvos (DDVP), at 2 and 100 ppm, inhibited respiration by ∿29 and 57%, respectively.

Naled did not accumulate in whole body tissues of killifish (Fundulus heteroclitus) exposed to naled (Dibrom 14 EC, 85% ai) at 0.031, 0.063, and 0.127 ppm in static bioassay tests (sea water: pH 7.3 to 7.5; dissolved oxygen content 6.6 to 7.8 mg/l; daily temperature range 10-17 C) (00074643). Naled was not detected (<0.02 ppm) in any fish tissue samples taken over the 7-day test period. The degradate dichlorvos was found at a maximum concentration of 0.04 ppm, approximately twice the concentration in corresponding water samples, 1 hour after treatment, but was not found (<0.01 ppm) in tissue samples taken after 24 hours. Naled half-life in water samples was < 24 hours. Dichlorvos was found in all water samples, at a maximum concentration of ∿0.02 ppm after 24 hours, but <0.01 ppm was found in samples taken at the end of the test period.

In summary, naled and its degradate dichlorvos dissipate rapidly in aerobic soils with half-lives of ≤8 hours. Naled exhibits low to intermediate mobility in soils, whereas, dichlorvos is intermediately mobile to mobile. Mobility appears to be related to soil organic matter content. Naled degrades rapidly in aqueous solution (half-life ≤25 hours), with rates increasing at higher temperatures and pHs. Naled also rapidly degrades in sewage water (half-life < 24 hours) to dichlorvos and dichloroacetaldehyde. Neither naled nor dichlorvos accumulate in fish tissues. In conclusion, naled does not appear to represent an environmental hazard based on the aforementioned data which indicate very rapid degradation and extremely low bioaccumulation potential.

Summary of Major Data Gaps

The major data gaps for this chemical are: hydrolysis studies; photodegradation studies in water and air and on soil; aerobic and anaerobic soil metabolism studies

aerobic and anaerobic aquatic metabolism studies; leaching studies; volatility studies; terrestrial, aquatic, forestry, and long-term field dissipation studies; and rotational and irrigated crop studies.

References

Chevron Chemical Company. 1969. Analysis of naled and DDVP residues. File No. 740.01. Method RM-3G dated Oct. 31, 1969. Unpublished study received Nov. 30, 1970 under 0F0975; submitted by Chevron Chemical Co., Richmond, CA; CDL:095468-A. (00074885)

Leary, J.B. 1970. Decomposition of naled and DDVP in soils. File No. 721.2. Unpublished study received Nov. 27, 1970 under unknown Admin. No.; submitted by Chevron Chemical Co., Richmond, CA; CDL:120336-A. (00074759)

Leary, J.B. 1971. Rate of hydrolysis of naled in aqueous solution. File No. 721.2. Unpublished study received July 30, 1971 under 1F1111; submitted by Chevron Chemical Co., Richmond, CA; CDL:090881-A. (00074691)

Leary, J.B. 1974. Rate of decay of naled in sewage water. File No. 721.2. Unpublished study received Dec. 30, 1974 under 1769-203; prepared by Chevron Chemical Co., submitted by National Chemsearch, Division of NCH Corp., Irving, TX; CDL:224603-B. (00074644)

Leary, J.B., and M.D. Miesch, Jr. 1974. National Chemsearch Skychoda fate of naled in a sewage treatment plant. File No. 721.2. Unpublished study received Dec. 30, 1974; May 12, 1976 under 1769-203; prepared by Chevron Chemical Co., submitted by National Chemsearch, Division of NCH Corp., Irving, TX; CDL:224603-C. (00074645)

MacRae, I.C., and J.S. Celo. 1974. The effects of organophosphorus pesticides on the respiration of Azotobacter vinelandii. Soil Biol. Biochem. 6(2): 109-111. (05005579)

Pack, D.E. 1976. Residues of naled and DDVP in aquatic organisms living in Dibrom 14 treated water. File No. 721.11/Dibrom S-249. Includes method RM-

3G-3 dated Feb. 23, 1973. Unpublished study, including letter dated March 24, 1976 from J.B. Leary to Michael L. Paulson, received April 8, 1976 under 1769-203; prepared by Chevron Chemical Co., submitted by National Chemsearch, Division of NCH Corp., Irving, TX; CDL:224602-A. (00074643)

Pack, D.E. 1980. Mobility of naled and dichlorvos in soil as determined by soil thin-layer chromatography. File No. 722.2. Unpublished study received Oct. 20, 1980 under 239-1633; submitted by Chevron Chemical Co., Richmond, CA; CDL:243547-A. (00064796)